

PARTS SPECIFICATION

CODE IDENT NO. 23835
SPEC NO. CS515583 REV A
ISSUE DATE. 1992
SUPERSEDING.
DATED.

TRANSFORMER, LOW POWER, PULSE
GENERAL SPECIFICATION FOR

ENGINEER: J. PEDEN DATE
Section 514 Discrete Parts and
Integrated Circuits

RELEASED BY: J.W.ANDERSON DATE
Section 648 Technical Editor
Documentation Section

APPROVED BY: S.SOLLOCK DATE
Section 514 Supervisor,
Discrete Parts and Integrated
Circuits

JET PROPULSION LABORATORY
CALIFORNIA INSTITUTE OF TECHNOLOGY
PASADENA CALIFORNIA

CONTENTS

| <u>Paragraph</u> | | <u>Page</u> |
|------------------|--|-------------|
| 1. | SCOPE | 4 |
| 1.1 | Scope | 4 |
| 2. | APPLICABLE DOCUMENTS | 4 |
| 2.1 | Government documents | 4 |
| 2.1.1 | Specifications, standards, and handbooks | 4 |

| | | |
|-------------|---|----|
| 2.1.2. | Exceptions | 5 |
| 2.3 | Order of Precedence | 5 |
| 3. | DEFINITIONS | 5 |
| 3.1 | Definitions | 5 |
| 3.1.1 | Acquiring activity | 5 |
| 3.1.2 | Trace number | 5 |
| 3.1.3 | Contract technical manager | 5 |
| 3.1.4 | Certification | 5 |
| 3.1.5 | Technical direction | 5 |
| 5. | DETAILED REQUIREMENTS | 5 |
| 5.3 | Radiographic inspection (when applicable) | 5 |
| 5.4 | Marking | 5 |
| 5.4.1 | Part number | 5 |
| 5.5 | Manufacturing Practices | 6 |
| 5.5.8 | In-process inspection | 6 |
| 5.5.12 | Prepot visual inspection | 6 |
| 5.5.12.8 | Cores | 6 |
| 5.6 | Quality assurance provisions | 6 |
| 5.6.1 | Product assurance program | 6 |
| 5.6.1.1 | Documentation | 6 |
| 5.6.1.2 | Data required with shipment | 6 |
| 5.6.1.3 | Problem notification | 7 |
| 5.6.1.4 | DPA samples | 7 |
| 5.6.6 | First article inspection | 7 |
| 5.6.7 | Quality conformance inspection | 7 |
| 5.6.7.3 | Group A screening inspection | 7 |
| 5.6.7.3.3 | Analysis of catastrophic failures | 7 |
| 5.6.7.3.4 | Disposition of Group A rejects | 7 |
| 5.6.7.4 | Group B inspection | 7 |
| 5.6.7.4.3 | Disposition of sample units | 7 |
| 5.6.7.4.4 | Noncompliance | 7 |
| 5.6.7.4.4.2 | Class S devices | 7 |
| 5.6.7.5 | Inspection of packaging | 8 |
| 5.6.7.5.1 | Packing slip and invoice | 8 |
| 5.6.7.6 | Customer source inspection | 8 |
| 5.6.7.7 | Status reporting | 8 |
| 6. | NOTES | 10 |
| 6.1 | Ordering data | 10 |

TABLES

| | | |
|-----|--|----|
| IV | Group B tests for low power pulse transformers | 9 |
| VII | Group A screening tests for family 31 | 11 |

APPENDIX B

| | | |
|------------|--|----|
| 30.1.1 | Thermal shock | 10 |
| 30.1.2 | Burn-in | 10 |
| 30.1.2.1 | Transformers | 10 |
| 30.1.2.1.1 | Power burn-in | 10 |
| 30.1.2.1.1 | Power burn-in | 10 |
| 30.1.2.1.2 | No load power burn-in | 10 |
| 30.1.2.2 | No load burn-in for inductors | 10 |
| 30.4 | Low power pulse transformers (family 31) | 11 |

1. SCOPE

1.1 Scope. This document establishes the general manufacturing and testing requirements for low power pulse transformers. MIL-STD-981 is used as the baseline; this document lists exceptions to it and adds requirements to make it suitable for the acquisition of transformers to meet the quality and reliability requirements of JPL Mission Class A and B missions. Detail requirements, specific characteristics of transformers, and other provisions which are sensitive to the particular use intended shall be specified in the applicable detail specification. This document is not intended for qualification of parts or for listing on an approved parts list.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. Delete and substitute as follows:

The Class S requirements for low power pulse transformers (family 31) of the following documents, of the issue indicated, form a part of this specification unless exceptions are noted herein, in the detail specification, or in the procurement document. The contractor may contact the JPL contract negotiator to obtain copies of these documents.

SPECIFICATION

Federal

| | |
|----------|---|
| J-W-1177 | Wire, Magnet, Electrical |
| QQ-S-571 | Solder, Tin Alloy, Tin-Lead Alloy, Lead Alloy |

Military

| | |
|--------------|---|
| MIL-T-21038D | Transformers, Pulse, Low Power, General Specification for, including Amendments 1 and 2 and Supplement 1. |
|--------------|---|

STANDARDS

Military

| | |
|--------------|--|
| MIL-STD-202 | Test Methods for Electronic and Electrical Component Parts. |
| MIL-STD-981B | Design, Manufacturing, and Quality Standards for Custom Electromagnetic Devices for Space Application. |

Add paragraph 2.1.2 as follows:

2.1.2. Exceptions. References to the U.S. Government and its agencies shall be taken to refer to JPL (e.g., JPL QA source inspection shall be substituted for GSI). References to "QPL", and "qualified" do not apply. The detail specification shall be the JPL detail specification.

2.3 Order of Precedence. Delete and substitute as follows: "In the event of conflict between the requirements of this specification and other requirements of the applicable device specification, the precedence in which requirements shall govern, in descending order, are as follows:

- a. Procurement document (contract or purchase order).
- b. Applicable detail specification (ST or PT drawing).
- c. This specification.
- d. Specification and Standard referenced in 2.1.

3. DEFINITIONS

3.1 Definitions. Add the following definitions.

3.1.1 Acquiring activity. The acquiring activity shall be JPL or its subcontractor; the representative usually will be the JPL contract technical manager or contract negotiator.

3.1.2 Trace number. The trace number is the number assigned by the procurement document to link a part number to a specific order or order release.

3.1.3 Contract technical manager. The contract technical manager will be designated in the procurement document and shall be the principal technical interface between the manufacturer and JPL.

3.1.4 Certification. Certification shall mean approval by JPL of a manufacturer for acquisition of a family of devices. Government certification as intended in MIL-T-21038 is not implied.

3.1.5 Technical direction. Technical direction shall mean written direction, usually on a JPL Technical Direction Memorandum (TDM) form.

5. DETAILED REQUIREMENTS

5.3 Radiographic inspection (when applicable). Modify as follows:
"Radiographic inspection is required."

5.4 Marking. Delete the requirement for marking with the procurement document number and the manufacturer's CAGE number. Add the requirement to mark each part with a unique serial number.

Add paragraph 5.4.1 as follows:

5.4.1 Part number. The part number shall be marked per the JPL detail specification, in accordance with this format:

33333-L33333F
where:

| | |
|-------|--|
| 33333 | identifies the detail specification (minus the letter prefix) |
| L | identifies the JPL descriptor code for the device family (L is for electromagnetics) |
| 33333 | is the generic or manufacturer's catalog part number (or a part thereof) |
| F | indicates the general package style: D = dual in-line (DIP) F = flat-pack Y = see detail specification or elsewhere for description |

5.5 Manufacturing Practices.

5.5.8 In-process inspection. Add the following: "JPL QA will perform 100% internal visual inspection at prepot. The contractor shall notify JPL QA at least 2 working days in advance of the scheduled inspection time. JPL QA representatives shall have the option of performing surveillance at any of the inspection stations as defined in the manufacturing process."

5.5.12 Prepot visual inspection.

5.5.12.8 Cores. Delete item c. and substitute as follows:

- c. All molypermalloy powder cores (MPP) shall be coated to provide a minimum breakdown of 500 V rms.

5.6 Quality assurance provisions.

5.6.1 Product assurance program. Add the following: "Information regarding recent DESC audits, if any, shall be provided upon request."

5.6.1.1 Documentation. Add as follows: "The manufacturer shall make available the lot traveler(s) for each part style and schematic (covering assembly, in-process inspections, screen, and, if required, QCI operations) for review and approval by technical direction from the JPL contract technical manager prior to use with their respective JPL lots."

5.6.1.2 Data required with shipment. The following data shall be included with each shipment of screened parts:

- a. a copy of the completed lot traveler(s) used for screening and QCI
- b. a copy of attributes test data
- c. electrical test data for all specified tests, including control unit data
- d. data for any other special tests required by the detail specification or procurement document
- e. copies of reports on any failure analyses, DPA, or engineering evaluations performed by the manufacturer
- f. copies of any waivers or Technical Direction Memoranda (TDMs) altering the specified requirements
- g. a copy of the JPL prepot Inspection Report

5.6.1.3 Problem notification. The contractor shall notify the JPL contract technical manager and the contract negotiator within two working days of the occurrence of any of the following:

- a. Any catastrophic failure after initial electrical test.
- b. Any failures in excess of PDA, including failures which appear to result from equipment failure or operator error
- c. Any Group B failure
- d. Any need for re-marking serial numbers.

5.6.1.4 DPA samples. The manufacturer shall make available to the JPL contract technical manager 3 samples upon completion of final electrical test in screening. The DPA samples may be delta rejects and/or high- and low- temperature parametric rejects. The manufacturer shall continue processing of the lot. There is no lot jeopardy associated with the results of JPL's DPA unless a defect is found which is unacceptable under the terms of the contract.

5.6.6 First article inspection. Does not apply.

5.6.7 Quality conformance inspection.

5.6.7.3 Group A screening inspection. Add the following: "The requirements for Class S apply. Radiographic inspection is required."

Add paragraphs 5.6.7.3.3 and 5.6.7.3.4 as follows:

5.6.7.3.3 Analysis of catastrophic failures. Catastrophic failures (ie., shorts or opens measurable or detectable at +25C) subsequent to burn-in shall be analyzed. The contractor shall notify the JPL contract technical manager within two working days of the occurrence of such failures. JPL retains the option of performing failure analysis: the manufacturer shall not do any analysis destructive of the part without prior consent of the JPL contract technical manager. Analysis of catastrophic failures may be limited to a quantity and degree sufficient to establish failure mode and cause and the result shall be documented and made available to the JPL contract technical manager.

5.6.7.3.4 Disposition of Group A rejects. Transformers which fail any of the Group A inspections shall be identified as to the test failed and retained with the lot data.

5.6.7.4 Group B inspection.

5.6.7.4.3 Disposition of sample units. Delete and substitute as follows: "Samples used for Group B shall be retained by the manufacturer with the master file of data for the lot."

5.6.7.4.4 Noncompliance.

5.6.7.4.4.2 Class S devices. Modify as follows: JPL retains the option of performing failure analysis: the manufacturer shall not do any analysis destructive of the part without prior consent of the JPL contract technical manager.

5.6.7.5 Inspection of packaging. Delete and substitute as follows: "Inspection of packaging for delivery shall be as specified in MIL-T-21038 with the following changes:

5.1.1 Level A. Delete

5.2 Packing. Levels A and B packing do not apply.

5.2.1 Level A. Delete

5.2.2 Level B. Delete

5.3 Marking. Add: The contractor shall mark the initial container (unit package) with the JPL trace number.

5.4 General.

5.4.3 Army procurement. Delete

Add paragraphs 5.6.7.5.1, 5.6.7.6, and 5.6.7.7 as follows:

5.6.7.5.1 Packing slip and invoice. The packing slip and invoice shall include the JPL trace number associated with each line item.

5.6.7.6 Customer source inspection. JPL QA will perform 100% internal visual inspection at prepot, and 100% visual inspection and audit of documentation at pre-ship. (The latter may be waived by technical direction from the JPL contract technical manager if QA personnel are not available.) The contractor shall notify JPL QA at least two working days in advance of the scheduled inspection time. Adequate inspection stations shall be provided for the JPL QA representative. JPL QA representatives shall have the option of performing surveillance at any of the inspection stations as defined in the manufacturing process.

5.6.7.7 Status reporting. The contractor shall provide the JPL contract technical manager and the contract negotiator every two weeks with an oral or written status report stating the current status (point on the lot traveler and quantity of parts in the lot) and expected ship date of each lot in process, and noting any significant problems.

TABLE IV Group B tests for power transformers, power inductors, audio inductors, audio transformers, high power pulse transformers, charging inductors, saturable transformers, and saturable inductors (families 03, 04, 20, 21, 36, 37, 40, and 41 respectively) and low power pulse transformers (family 31) (see 5.6.7.4). Delete and substitute as follows:

TABLE IV Group B tests for low power pulse transformers (family 31) (see 5.6.7.4)

| Test (1) | Class S | |
|--|-------------|-------------------------|
| | Sample Size | Defective Units Allowed |
| <i>Subgroup 1</i> | | |
| Resistance to soldering heat | | |
| Terminal strength | | |
| Electrical characteristics | 2 | 0 |
| Dielectric withstanding voltage (2) (at atmospheric pressure) | | |
| Extended thermal cycles (4) | | |
| Electrical characteristics | | |
| Dielectric withstanding voltage | | |
| Insulation resistance (3) | | |
| Visual and mechanical examination (internal) | | |
| <i>Subgroup 2</i> | | |
| Vibration | | |
| Shock | | |
| Resistance to solvents | 2 | 0 |
| Solderability | | |
| Insulation resistance (3) | | |
| Dielectric withstanding voltage | | |

(1) Specified tests shall be performed in accordance with MIL-T-21038.

(2) At maximum temperature for the class.

(3) At specified voltage with IR of 10,000 megohms minimum.

(4) Same procedure as Group A thermal cycle test, except for 25 thermal cycles.

Add section 6 as follows:

6. NOTES

6.1 Ordering data. Acquisition documents will specify the following:

- a. Type designation/part number.
- b. Number of associated detail specification.
- c. Any difference in test data requirements from those listed in 4.9 herein.
- d. Name and telephone number of JPL contract negotiator
- e. Name and telephone number of JPL contract technical manager.
- f. Name and telephone number of JPL QA coordinator of source inspections.
- g. JPL trace number
- h. Any special requirements which differ from those indicated herein or in the detail specification (eg. those involving source inspections, traceability, etc.).

APPENDIX B. **SCREENING TESTS**30.1.1 Thermal shock. Delete and substitute as follows:

Thermal shock. Thermal shock screening shall be in accordance with MIL-T-21038, and as follows:

- a. Number of cycles: 10.
- b. Continually monitor continuity during all thermal cycles to verify no intermittent conditions. Continuity monitoring current shall not exceed 3 microamperes. Equipment shall be capable of detecting intermittent opens exceeding 100 microseconds.

30.1.2 Burn-in.30.1.2.1 Transformers.30.1.2.1.1 Power burn-in. Delete and substitute as follows:30.1.2.1.1 Power burn-in. Devices shall be tested as follows:

- a. Test duration: 168 hours minimum.
- b. Test temperature: Maximum temperature per the JPL detail specification.
- c. Test voltages and currents: Rated input voltage and current at maximum rated frequency and at maximum rated load.

30.1.2.1.2 No load power burn-in. Delete30.1.2.2 No load burn-in for inductors. Delete

TABLE VII Group A screening tests for families 03, 04, 11, 12, 20, 21, 31, 36, 37, 40, and 41, respectively (see 30.1, 30.2, and 30.4). Delete and substitute as follows:

TABLE VII Group A screening tests for family 31 (see 30.1 and 30.4).

| Examination/ Tests | Applicable MIL-spec | Inspection |
|----------------------------|---------------------|------------|
| <i>Subgroup 1</i> | | |
| Electrical Characteristics | MIL-T-21038 | |

| | | |
|---|----------------|-------------|
| Insulation resistance | MIL-T-21038 | 100 percent |
| Dielectric withstanding voltage | MIL-T-21038 | |
| Thermal shock | See 30.1.1 | |
| Electrical characteristics | MIL-T-21038 | |
| Burn-in | See 30.1.2 | |
| Electrical characteristics | MIL-T-21038 | |
| Dielectric withstanding voltage | MIL-T-21038 | |
| Induced voltage | MIL-T-21038 | |
| Insulation resistance | MIL-T-21038 | |
| Radiographic inspection | See appendix C | |
| <i>Subgroup 2</i> | | |
| Visual and dimensional examination (external) | MIL-T-21038 | 100 percent |

30.4 Low power pulse transformers (family 31). Delete and substitute as follows:

Low power pulse transformers (family 31). These devices shall be subjected to the group A screening tests in Table VII.

Filename: CS515583.A
Directory: H:\USERS\514\SPECS\ACT-GENL
Template: F:\USERS\JSANSONE\MSOFFICE\WINWORD\TEMPLATE\NORM
AL.DOT
Title:
Subject:
Author: Jennifer Sansone
Keywords:
Comments:
Creation Date: 08/10/95 2:15 PM
Revision Number: 1
Last Saved On:
Last Saved By:
Total Editing Time: 0 Minutes
Last Printed On: 08/10/95 2:19 PM
As of Last Complete Printing
Number of Pages: 10
Number of Words: 2,841 (approx.)
Number of Characters: 16,197 (approx.)